JOURNEY INSIDE THE ATOM

Play & Learn Puzzle Workbook | Class 9 Science (Chapter 8)

PLAY & LEARN INDEX TABLE

Section	Puzzle Type	Description
Part 1	Scrambled Words	Unscramble key atomic vocabulary terms
Part 2	Crossword Puzzle	Test your knowledge of atomic structure definitions
Part 3	True or False Challenge	Evaluate scientific statements about atomic models
Part 4	Word Search	Locate hidden terms related to subatomic particles and scientists
Part 5	Odd One Out	Identify the term that doesn't belong and explain why
Part 6	Fill in the Blanks	Complete sentences on electronic configuration and valency
Part 7	Matching Pairs	Connect scientists and concepts to their correct descriptions
Part 8	Atomic Math Drill	Calculate protons, neutrons, electrons, and mass numbers
Part 9	Analogy & Application	Connect everyday Indian examples to atomic principles

Part 10	Challenge Decoding	Solve multi-step atomic puzzles and isotope riddles

PART 1: SCRAMBLED WORDS (UNSCRAMBLE THE ATOM)

Unscramble the letters below to reveal key terms from Chapter 8. Use the clues provided to guide your detective work!

1. R A P M A N U — *Clue: Ancient Indian term proposed by sage Kanada for indivisible particles of matter.*

2. O M T O A S — *Clue: Greek philosophical term meaning 'uncuttable'.*

3. C L E U S U N — *Clue: The dense central core of an atom containing protons and neutrons.*

4. R E O T P N — *Clue: A positively charged subatomic particle discovered by Rutherford.*

5. T O R U N E N — *Clue: A neutral subatomic particle discovered by James Chadwick in 1932.*

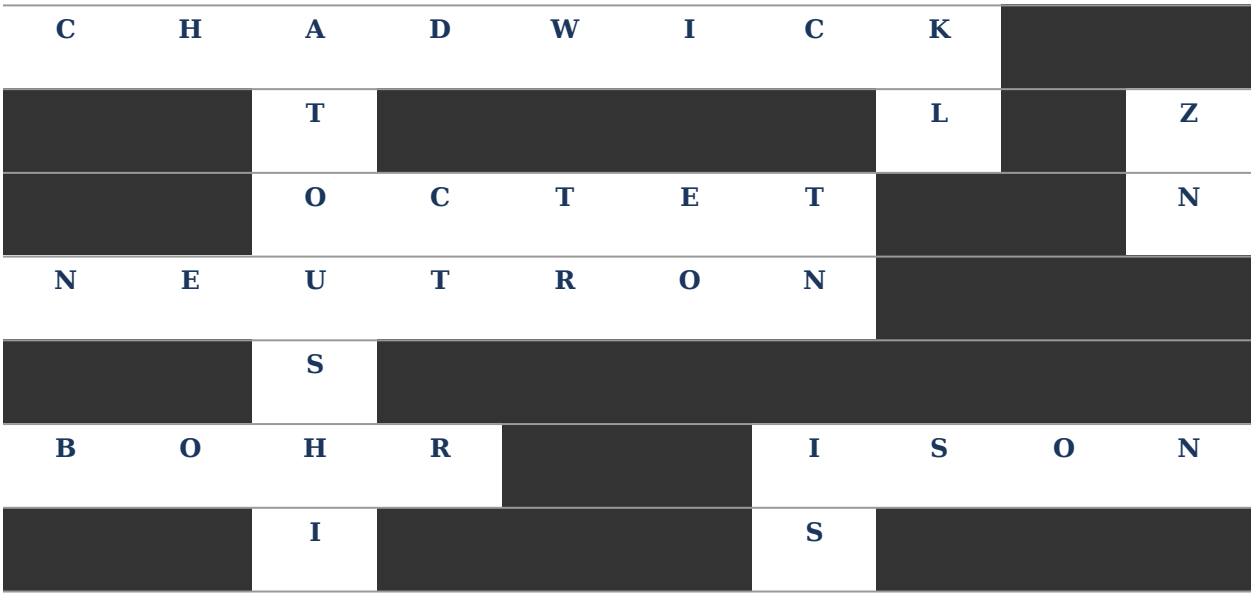
6. V A L E N Y C — *Clue: The combining capacity of an atom, determined by its valence electrons.*

7. P T O S I O E — *Clue: Atoms of the same element with identical atomic numbers but different mass numbers.*

8. R A I S O B — *Clue: Atoms of different elements sharing the same mass number.*

PART 2: CROSSWORD PUZZLE

Test your understanding of atomic structure definitions by solving the crossword puzzle below using the Across and Down clues.



P	L	U	M		O		
		M			T		
I	S	O	T	O	P	E	

Across Clues:

1. Scientist who discovered the neutron in 1932.
3. Stable arrangement of 8 electrons in the valence shell.
4. Neutral subatomic particle located in the nucleus.
6. Danish physicist who proposed fixed stationary orbits/shells.
8. Type of 'pudding' model proposed by J.J. Thomson.
10. Atoms sharing atomic number but differing in neutron count.

Down Clues:

2. Symbol representing atomic number.
5. Center of the atom containing protons and neutrons (Nucleus).
7. Twin atoms with identical atomic number (Isotope).
9. Element symbol for Nitrogen (N).

PART 3: TRUE OR FALSE CHALLENGE

Read each statement carefully and write 'TRUE' or 'FALSE'. If false, explain briefly why.

1. John Dalton proposed that atoms are divisible and contain electrons.
Answer: FALSE (Dalton proposed atoms were indivisible).

2. J.J. Thomson discovered the electron using cathode ray tubes.
Answer: TRUE

3. Rutherford's alpha particle scattering experiment proved that the atom is mostly solid mass.
Answer: FALSE (It proved the atom is mostly empty space with a dense nucleus).

4. The maximum number of electrons in any shell is given by the formula 2n squared.
Answer: TRUE

5. Isotopes of an element have different atomic numbers but the same mass number.
Answer: FALSE (Isotopes have the same atomic number and different mass numbers).

6. Chadwick discovered the neutron, which carries no electrical charge.
Answer: TRUE

PART 4: WORD SEARCH

Find the hidden atomic terms in the letter grid below. Words may be hidden horizontally, vertically, or diagonally.

P	**R**	**O**	**T**	**O**	**N**	**X**	**B**	**A**	**H**
E	**L**	**E**	**C**	**T**	**R**	**O**	**N**	**O**	**R**
N	**E**	**U**	**T**	**R**	**O**	**N**	**U**	**M**	**T**
B	**O**	**H**	**R**	**A**	**Z**	**I**	**S**	**O**	**N**
S	**A**	**D**	**H**	**A**	**R**	**A**	**I**	**D**	**K**
I	**S**	**O**	**B**	**A**	**R**	**T**	**L**	**E**	**Y**

Word Bank: PROTON | ELECTRON | NEUTRON | BOHR | ISOBAR | AADHAAR

PART 5: ODD ONE OUT

In each group of four terms, one does not belong. Identify the odd one out and explain the underlying scientific reason.

Group A: Thomson model, Rutherford model, Bohr model, Dalton theory
Odd One Out & Reason: Dalton theory (Dalton viewed atoms as indivisible spheres without subatomic particles; the others are dynamic internal atomic models).

Group B: Proton, Electron, Neutron, Molecule
Odd One Out & Reason: Molecule (A molecule is a combination of atoms, whereas the others are fundamental subatomic particles).

Group C: K shell, L shell, M shell, Nucleus
Odd One Out & Reason: Nucleus (The nucleus is the central core containing nucleons, whereas K, L, M are electronic energy shells).

Group D: Protium, Deuterium, Tritium, Isobar
Odd One Out & Reason: Isobar (Protium, deuterium, and tritium are isotopes of hydrogen; isobars are atoms of different elements with the same mass number).

PART 6: FILL IN THE BLANKS

Complete the sentences below using precise scientific terms from Chapter 8.

1. The number of protons in the nucleus of an atom is called its _____ number (Z).

2. The total sum of protons and neutrons in an atom's nucleus is called its _____ number (A).

3. The maximum capacity of electrons in any energy shell is given by the formula _____.

4. Atoms of the same element that have the same atomic number but different neutron counts are called _____.

5. The outermost electron-containing shell of an atom is known as the _____ shell.

PART 7: MATCHING PAIRS

Match each scientist or concept in Column A with the correct description in Column B.

Column A (Term/Scientist)	Column B (Description / Contribution)
1. J.J. Thomson	A. Discovered the neutron in 1932
2. Ernest Rutherford	B. Proposed the plum pudding / watermelon model with embedded electrons
3. Niels Bohr	C. Proposed fixed stationary orbits (K, L, M, N shells) for electrons
4. James Chadwick	D. Conducted the gold foil experiment and discovered the nuclear atom

PART 8: ATOMIC MATH DRILL

Calculate the missing values for protons, neutrons, electrons, atomic number (Z), and mass number (A) for the elements below.

Element / Ion	Atomic No. (Z)	Protons (p+)	Neutrons (n0)	Electrons (e-)	Mass No. (A)
Carbon-12	6	6	6	6	12
Sodium-23	11	11	12	11	23
Phosphorus-31	15	15	16	15	31
Argon-40	18	18	22	18	40

PART 9: ANALOGY & APPLICATION

Connect everyday Indian-life analogies from Chapter 8 to their exact scientific counterparts.

1. The Aadhaar Number Analogy: In Chapter 8, atomic number (Z) is compared to an individual's Aadhaar number because it is fixed, permanent, and uniquely identifies an element.

2. The Metro Station Shell Analogy: Bohr's energy levels are compared to metro stations (e.g., Delhi or Mumbai Metro) because electrons occupy fixed orbits and cannot linger in the spaces between stations/shells.

3. The Stadium Seating Rule: The 2n squared electronic distribution rule is compared to filling Wankhede Stadium's lower tier completely before opening the upper tier.

4. The Watermelon Model: J.J. Thomson's plum pudding model is compared to a watermelon, where red pulp represents positive charge and black seeds represent embedded electrons.

PART 10: CHALLENGE DECODING

Solve the advanced multi-step atomic puzzles below.

Puzzle 1 (Weighted Average): Chlorine consists of 75% Cl-35 and 25% Cl-37. Calculate its weighted average atomic mass. Show your steps.

Solution Hint: *(35 × 0.75) + (37 × 0.25) = 26.25 + 9.25 = 35.5 u.*

Puzzle 2 (Electronic Configuration Riddle): An atom has 2 electrons in the K shell, 8 in the L shell, and 5 in the M shell. What is its atomic number, element name, and valency?

Solution Hint: *Total electrons = 2 + 8 + 5 = 15 (Phosphorus, P). Valency = 8 - 5 = 3.*

ANSWER KEY

Use this section to verify your answers across all 10 parts of the workbook.

Part 1: Scrambled Words: 1. Parmanu | 2. Atomos | 3. Nucleus | 4. Proton | 5. Neutron | 6. Valency | 7. Isotope | 8. Isobar

Part 2: Crossword Puzzle: Across: 1. Chadwick, 3. Octet, 4. Neutron, 6. Bohr, 8. Plum, 10. Isotope | Down: 2. Z, 5. Nucleus, 7. Isotope, 9. N

Part 3: True or False: 1. False | 2. True | 3. False | 4. True | 5. False | 6. True

Part 4: Word Search: Terms located: PROTON, ELECTRON, NEUTRON, BOHR, ISOBAR, AADHAAR

Part 5: Odd One Out: A: Dalton theory | B: Molecule | C: Nucleus | D: Isobar

Part 6: Fill in the Blanks: 1. Atomic | 2. Mass | 3. $2n^2$ | 4. Isotopes | 5. Valence

Part 7: Matching Pairs: 1-B, 2-D, 3-C, 4-A

Part 8: Atomic Math Drill: Carbon-12 (6,6,6,6,12), Sodium-23 (11,11,12,11,23), Phosphorus-31 (15,15,16,15,31), Argon-40 (18,18,22,18,40)

Part 9: Analogy & Application: Verified against Chapter 8 everyday connections (Aadhaar, Metro, Stadium, Watermelon).

Part 10: Challenge Decoding: 1. Weighted average = 35.5 u | 2. Atomic number = 15 (Phosphorus), Valency = 3.